

Amendments to the Claims

Please amend Claims 1 through 5, 12, 13, 15, 20, 21, 23, and 24. Please add new Claims 25 through 32. The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Currently amended) A variable-impedance active ankle foot orthosis comprising
~~an actuator~~ a device for modulating an impedance of an orthotic joint throughout a walking cycle for treating an ankle foot gait pathology.
2. (Currently amended) The device of Claim 1, wherein the device includes an actuator that modulates the impedance of the orthotic joint by controlling stiffness to achieve ~~orthosis~~ includes a torsional spring ~~stiffness~~ control.
3. (Currently amended) The device of Claim 1, wherein the device includes an actuator that modulates the impedance of the orthotic joint by controlling at least one of a spring stiffness, a spring damping, or both to achieve ~~orthosis~~ includes a spring-damper positional control.
4. (Currently amended) The device of Claim 1, wherein the device includes an actuator that is coupled to a foot portion of the orthosis.
5. (Currently amended) The device of Claim 1, wherein the device includes an actuator that is a series elastic actuator.
6. (Original) The device of Claim 1, wherein the orthosis includes an ankle angle sensor.

7. (Original) The device of Claim 1, wherein the orthosis includes one or more ground reaction force sensors.
8. (Original) The device of Claim 1, wherein the orthosis includes an actuator, an ankle angle sensor, one or more ground reaction force sensors, and a controller for controlling the orthosis.
9. (Original) The device of Claim 1, wherein the orthosis includes a foot switch.
10. (Original) The device of Claim 1, wherein the orthosis is used to treat drop foot gait.
11. (Original) The device of Claim 1, wherein the orthosis is used to treat a patient having anterior muscle weakness, posterior muscle weakness, or a combination thereof.
12. (Currently amended) A device for treating an ankle foot gait pathology comprising:
an orthosis including [[a]] an orthosis leg portion attachable to a leg of a person and [[a]] an orthosis foot portion attachable to a foot of the person, the orthosis leg portion and the orthosis foot portion defining an orthotic joint; and
~~an actuator attachable to the leg portion for acting~~ configured to act on a spring disposed between the actuator and the foot portion to modulate an impedance of the orthotic joint throughout a walking cycle.
13. (Currently amended) The device of Claim 12, wherein the actuator adjusts stiffness of the ~~orthosis~~ orthotic joint by controlling the spring deflection during controlled plantar flexion to minimize forefoot collisions with the ground.
14. (Original) The device of Claim 12, wherein the actuator minimizes the impedance during late stance.

15. (Currently amended) The device of Claim 12, wherein the actuator ~~applies~~ modulates the impedance of the orthotic joint by controlling at least one of a spring stiffness or a spring damping, or both to achieve a spring-damper ~~positional~~ control during a swing phase.
16. (Original) The device of Claim 12, further comprising an ankle angle sensor.
17. (Original) The device of Claim 12, further comprising one or more ground reaction force sensors.
18. (Original) The device of Claim 12, further comprising a controller for controlling the orthosis.
19. (Original) A method comprising modulating an impedance of an orthotic joint of an orthosis throughout a walking cycle.
20. (Currently amended) The method of Claim 19, wherein the step of modulating the impedance of the orthotic joint throughout the walking cycle further includes adjusting the stiffness of the orthotic joint during controlled plantar flexion to minimize forefoot collisions with the ground.
21. (Currently amended) The method of Claim 20, wherein the stiffness of the orthotic joint is adjusted ~~by applying a biomimetic~~ to achieve a torsional spring control.
22. (Original) The method of Claim 19, further comprising minimizing the impedance during late stance.
23. (Currently amended) The method of Claim 19, wherein the step of modulating the impedance of the orthotic joint throughout the walking cycle further comprising comprises modulating at least one of spring stiffness, spring damping, or both of ~~applying~~ a torsional spring-damper ~~positional~~ control during a swing phase.

24. (Currently amended) A method of treating an ankle foot gait pathology using functional electrical stimulation, comprising applying electrical pulses to elicit muscle contractions to actively modulate ankle ~~impedance~~ stiffness to achieve a torsional spring control during controlled plantar flexion so as to minimize forefoot collisions with the ground, ~~minimizing impedance during late stance~~, and to actively modulate at least one of spring stiffness, spring damping or both to achieving achieve a torsional spring-damper positional control during a swing phase.
25. (New) A variable-impedance active ankle foot orthosis comprising:
an actuator and a spring operatively linked to the actuator, the actuator modulating an impedance of an orthotic joint by controlling a spring compression in response to at least two sensed parameters throughout a walking cycle, the actuator modulating the impedance of the orthotic joint by controlling the spring in at least three different modulation phases of the walking cycle in response to the at least two sensed parameters.
26. (New) The variable-impedance active ankle foot orthosis of Claim 1, wherein the device further includes a spring linked to an actuator, wherein the actuator modulates the impedance of an orthotic joint by controlling the spring.
27. (New) The variable-impedance active ankle foot orthosis of Claim 26, wherein the actuator modulates the impedance of the orthotic joint by controlling stiffness of a torsional spring control.
28. (New) The variable-impedance active ankle foot orthosis of Claim 27, wherein the actuator modulates the impedance of the orthotic joint by controlling at least one of a spring stiffness, a spring damping or both of a torsional spring-damper control.

29. (New) The method of Claim 19, further including the steps of operatively coupling a spring to the orthotic joint of the orthosis, and sensing one or more parameters of the orthotic joint throughout the walking cycle.
30. (New) The method of Claim 29, wherein the impedance of the orthotic joint of the orthosis is modulated by controlling the spring in response to the sensed parameters.
31. (New) The method of Claim 24, wherein the impedance is modulated by controlling a spring operatively connected to an orthotic joint.
32. (New) The method of Claim 19, further including the steps of operatively receiving a parameter of a forefoot force signal throughout the walking cycle and modulating the impedance of the orthotic joint in response to the parameter.